

# COMMUNICATIONS MARKET ASSESSMENT

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COMMUNICATIONS MARKET ASSESSMENT

FOR  
McGRAW-HILL  
NEW YORK, NY

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AUTHOR

TITLE COMMUNICATIONS MARKET  
ASSESSMENT

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## COMMUNICATIONS MARKET ASSESSMENT AGENDA

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1. COMMUNICATIONS MARKET SEGMENTS (SUMMARY)
2. CONCLUSIONS
3. COMMUNICATIONS MARKET OVERVIEW
4. COMMUNICATIONS MARKET SEGMENTS (DETAIL)
5. FURTHER RESEARCH
6. SOURCES OF INFORMATION



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## COMMUNICATIONS MARKET SEGMENTS

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## COMMUNICATIONS MARKET SEGMENTS

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- COMMUNICATIONS TRANSMISSION
  - VOICE
    - LOCAL
    - LONG DISTANCE
  - DATA
- COMMUNICATIONS APPLICATIONS
  - ELECTRONIC MAIL
  - FACSIMILE
  - TELECONFERENCING
- COMMUNICATIONS EQUIPMENT
  - SUBSCRIBER EQUIPMENT
  - TELCO EQUIPMENT
  - PBX
  - FIBER OPTICS
  - DIGITAL MICROWAVE
  - SATELLITE
  - CELLULAR MOBILE RADIO
  - LOCAL AREA NETWORKS
  - VALUE ADDED NETWORKS



CONCLUSIONS

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COMMUNICATIONS MARKETS REVENUES (U.S. ONLY)

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|                                                             | <u>1983</u> | <u>1985</u> | <u>AAGR</u> | <u>1990</u> | <u>AAGR</u> |
|-------------------------------------------------------------|-------------|-------------|-------------|-------------|-------------|
| <u>COMMUNICATION TRANSMISSION</u>                           |             |             |             |             |             |
| - VOICE AND DATA (TRANSMISSION)                             | \$62.5B     | \$78B       | 12%         | \$129B      | 10.5%       |
| <u>COMMUNICATION APPLICATIONS</u>                           |             |             |             |             |             |
| - ELECTRONIC MAIL<br>(SERVICE AND EQUIPMENT REV.)           | \$1.45B     | \$2.27B     | 25%         | \$8.4B      | 30%         |
| - FACSIMILE (TRANSMISSION)                                  | \$244M      | \$322M      | 15%         | \$856M      | 22%         |
| - FACSIMILE (EQUIPMENT)                                     | \$370M      | \$530M      | 70%         | \$1.11B     | 16%         |
| - TELECONFERENCING (EQUIPMENT,<br>TRANSMISSION AND SERVICE) | \$200M      | \$580M      | 70%         | \$2.08B     | 28%         |
| <u>COMMUNICATION EQUIPMENT</u>                              |             |             |             |             |             |
| - PBX (EQUIPMENT)                                           | \$3.5B      | \$5.0B      | 20%         | \$10.0B     | 15%         |
| - FIBER OPTICS (SALES OF FIBER<br>OPTIC CABLE)              | \$238M      | \$414M      | 32%         | \$1.5B      | 29%         |
| - DIGITAL MICROWAVE (EQUIPMENT)                             | \$210M      | \$254M      | 10%         | \$395M      | 10%         |
| - SATELLITE (REVENUES FOR USING<br>SATELLITES)              | \$288M      | \$377M      | 15%         | \$1B        | 22%         |
| - CELLULAR MOBILE RADIO<br>(EQUIPMENT)                      | \$ *        | \$275M      | NMF         | \$450M      | 12%         |
| - CELLULAR MOBILE RADIO (SERVICE)                           | \$ *        | \$750M      | NMF         | \$1.75B     | 19%         |
| - LAN'S (INSTALLED BASE OF<br>EQUIPMENT)                    | \$100M      | \$1.2B      | N/A         | \$3.2B      | N/A         |
| - VAN'S (REVENUE FOR USING<br>VALUE ADDED NETWORKS)         | \$230M      | \$400M      | 33%         | \$995M      | 20%         |

NMF - NO MEANINGFUL FIGURE      N/A - NOT APPLICABLE

AAGR - AVERAGE ANNUAL GROWTH RATE

\*NOTE: CELLULAR MOBILE RADIO SERVICE WAS INITIATED IN DECEMBER 1983 IN LIMITED MARKETS. NO ACTUAL FIGURES FOR 1983 ARE AVAILABLE.

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## CONCLUSIONS

- THE MARKET FOR TELECOMMUNICATIONS SERVICES AND EQUIPMENT WILL BE AFFECTED BY THE SAME FORCES PRESENTLY CHANGING THE COMPUTER AND DATA PROCESSING INDUSTRIES.
  - THESE MARKETS ARE BECOMING LESS TECHNOLOGY-DRIVEN AND MORE END-USER DRIVEN .
  - VENDORS OF COMPUTER HARDWARE AND SOFTWARE REALIZE THAT PURCHASERS CAN COME FROM THE RANKS OF TECHNICAL DATA PROCESSING STAFFS AS WELL AS NON-TECHNICAL, CORPORATE FUNCTIONAL DEPARTMENTS, SUCH AS FINANCE, MARKETING AND OPERATIONS, WHO HAVE BEGUN TO USE PERSONAL COMPUTERS AS PART OF THE DECISION-MAKING PROCESS. WHEREAS THE FORMER MAY HAVE BEEN IMPRESSED BY THE TECHNICAL SUPERIORITY OF ONE VENDOR'S PRODUCT OVER ANOTHER'S, THE NON-TECHNICAL, RELATIVELY COMPUTER-NAIVE END-USER PUTS LITTLE IMPORTANCE ON TECHNOLOGY AND MUCH EMPHASIS ON FUNCTIONALITY, SUCH AS EASE-OF-USE, ABILITY



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## CONCLUSIONS (cont'd)

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TO PERFORM THE NECESSARY CALCULATIONS AND PROVIDE THE INFORMATION REQUIRED FOR DECISION-MAKING. A GOOD EXAMPLE OF THE DE-EMPHASIS OF TECHNOLOGY CAN BE SEEN IN RECENT PRODUCT INTRODUCTION'S BY DIGITAL EQUIPMENT CORPORATION (DEC). DEC'S REPUTATION WAS BUILT ON WELL-ENGINEERED PRODUCTS, WHICH APPEALED TO DEC'S TRADITIONAL CUSTOMER BASE COMPOSED PRIMARILY OF SCIENTISTS AND ENGINEERS. WHEN DEC INTRODUCED ITS PERSONAL COMPUTER LINE, IT TRIED TO SHIFT FROM THAT TRADITIONAL BASE OF CUSTOMERS AND APPEAL TO THE NON-TECHNICAL CORPORATE DECISION-MAKER. THE PROBLEM DEC ENCOUNTERED WAS THAT IT STILL TRIED TO SELL TECHNOLOGY INSTEAD OF WHAT EXECUTIVES WERE REALLY LOOKING FOR - SOLUTIONS TO THEIR PROBLEMS.

- THE MARKET FOR VOICE AND DATA TRANSMISSION IS SIZEABLE BUT MATURING, THAT IS, ALTHOUGH THE SIZE OF THE VOICE AND DATA TRANSMISSION MARKET WILL BE GREATER THAN \$100B BY 1990, IT WILL BE GROWING AT A SLOWER RATE, 10.5%, THAN SEVERAL OTHER AREAS.



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## CONCLUSIONS (cont'd)

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- THE DISTINCTIONS BETWEEN VOICE, DATA AND VIDEO ARE BEING ELIMINATED BECAUSE OF NEW DIGITAL TRANSMISSION TECHNOLOGIES. RATHER THEN ATTACKING THIS RATHER LARGE MARKET, IT IS BETTER TO FOCUS ON THOSE COMMUNICATION APPLICATIONS AND EQUIPMENT WHICH SHOW THE MOST PROMISE.
- THE SECOND-HALF OF THE DECADE WILL SEE RAPID GROWTH IN COMMUNICATIONS APPLICATIONS. THE FOLLOWING APPLICATIONS WILL EXPERIENCE AAGR'S GREATER THAN 20% FOR END-USER SERVICE EXPENDITURES:
  - ELECTRONIC MAIL
  - FACSIMILE
  - TELECONFERENCING
- WHILE THE MARKET FOR COMMUNICATION EQUIPMENT WILL BE MATURING IN THE LAST HALF OF THIS DECADE, CERTAIN AREAS WILL SHOW GROWTH GREATER THAN 20%. THESE INCLUDE:
  - FIBER OPTICS
  - SATELLITE



## CONCLUSIONS (cont'd)

- LOCAL AREA NETWORKS (LAN'S)
  - TELECONFERENCING EQUIPMENT
  - VALUE ADDED NETWORKS
- 
- THE MARKET FOR TELECOMMUNICATIONS, PARTICULARLY FOR COMMUNICATION APPLICATIONS, WILL BE TIED CLOSELY TO THE GENERAL TREND TOWARDS OFFICE AUTOMATION. MICROELECTRONICS WILL CONTINUE TO PLAY A KEY ROLE.
- 
- PERSONAL COMPUTERS (PC'S)
  - WORKSTATIONS
  - LAN'S
  - PC-TO-MAINFRAME LINKS
  - PBX
  - CELLULAR MOBILE RADIO
  - SATELLITES
  - TRANSPORTABLE PC'S



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## CONCLUSIONS (cont'd)

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- MANY OF THESE DEVICES WILL COMBINE DATA PROCESSING AND TELECOMMUNICATIONS CAPABILITIES. FOR EXAMPLE, SEVERAL PC'S CURRENTLY AVAILABLE HAVE MODEMS AND PHONE SETS BUILT IN AS PART OF THE PC'S HARDWARE. INCLUDED AS PART OF THE SOFTWARE ARE FEATURES SUCH AS AUTOMATIC PHONE DIRECTORY LOOK-UP AND AUTO-DIAL. MANY OF THE PURCHASERS OF SUCH DEVICES WILL BE END USERS, SUCH AS CORPORATE EXECUTIVE DECISION MAKERS AND THEIR STAFF.
- THERE WILL BE A TREMENDOUS NEED FOR INFORMATION BY BOTH TECHNICAL COMMUNICATIONS MANAGERS AND NON-TECHNICAL END USERS. THESE NON-TECHNICAL END USERS WILL BE LOOKING FOR INSTRUCTION AND GUIDANCE.
  - HOW TO BEST EMPLOY THE EVOLVING COMMUNICATIONS APPLICATIONS TO SOLVE DAY-TO-DAY MANAGEMENT PROBLEMS.
  - HOW TO INTEGRATE THE RELATIVELY NEW MICRO-COMPUTER HARDWARE AND SOFTWARE WITHIN THIS NEW COMMUNICATIONS ENVIRONMENTS:



## CONCLUSIONS (cont'd)

- . SPREADSHEETS
  - . DATA BASE MANAGEMENT SYSTEMS
  - . WORD PROCESSING
  - . ON-LINE DATABASES
  - . GRAPHICS
- 
- THE COMMUNICATIONS MANAGER, MUCH LIKE THE DATA PROCESSING MANAGER, IS INTERESTED IN KEEPING UP WITH NEW TECHNICAL DEVELOPMENTS.
  
  - THERE WILL CONTINUE TO BE A DEMAND FOR INFORMATION DESCRIBING EVOLVING TECHNOLOGIES AFFECTING BOTH COMMUNICATION EQUIPMENT AND APPLICATIONS.
- 
- MOST COMMUNICATION DEVELOPMENTS WILL STRESS CROSS-INDUSTRY APPLICATIONS, THAT IS NOT UNIQUE TO ONE INDUSTRY BUT HAVING APPLICATION ACCROSS MANY INDUSTRIES.
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- HOWEVER, SOME INDUSTRIES WILL ALWAYS HAVE PARTICULAR COMMUNICATIONS/PROCESSING NEEDS:



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## CONCLUSIONS (cont'd)

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- . AUTOMATED TELLER MACHINES FOR BANKS,
- . AIRLINE RESERVATION SYSTEMS.
- . STOCK MARKET QUOTES, TRADES, AND SETTLEMENTS FOR BROKERAGE HOUSES.



## COMMUNICATIONS MARKET OVERVIEW

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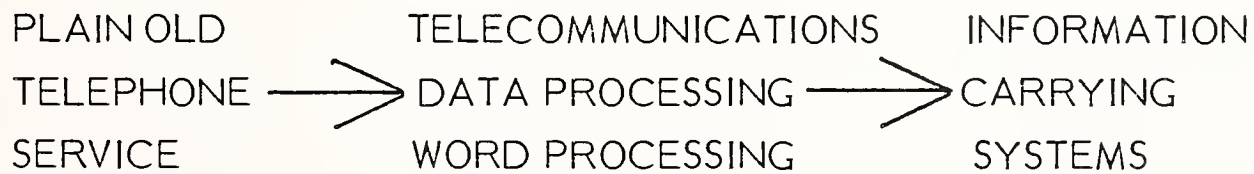
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TRENDS AFFECTING  
COMMUNICATIONS INDUSTRY (cont'd)

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1. VOICE, DATA AND VIDEO ARE BEING INTEGRATED INTO A SINGLE, HIGH-SPEED, DIGITAL TRANSMISSION NETWORK.
2. CENTRALIZED DATA BASES AND DISTRIBUTED PROCESSING ARE BEING LINKED TOGETHER. NETWORK COMPONENTS INCLUDE:
  - MICROCOMPUTERS AND MAINFRAMES
  - LOCAL AREA NETWORKS (LAN'S)
  - VALUE ADDED NETWORKS (VAN'S)
  - OFFICE AUTOMATION WORKSTATIONS
  - PERIPHERALS
3. NEW TECHNOLOGIES AND EVOLVING STANDARDS ARE MAKING THIS INTEGRATION POSSIBLE. THE DISTINCTIONS BETWEEN COMPUTER PROCESSING AND TELECOMMUNICATIONS, ARE BLURRING AS A RESULT OF TECHNICAL ADVANCES IN AREAS SUCH AS:
  - MICROPROCESSORS
  - DIGITAL SWITCHING



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TRENDS AFFECTING  
COMMUNICATIONS INDUSTRY (cont'd)

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- PBX'S
- FIBER OPTICS
- SATELLITES



COMMUNICATIONS MARKET SEGMENTS  
COMMUNICATIONS TRANSMISSION

INPUT



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VOICE & DATA REVENUE  
(\$ BILLIONS) 1983

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REVENUES COLLECTED BY COMMON CARRIERS (ATT, GTE, MCI, ITT, WESTERN UNIONS, OTHERS), FOR USE OF THEIR SWITCHED AND PRIVATE LINE FACILITIES, FOR THE TRANSMISSION OF VOICE AND DATA BY BUSINESS AND RESIDENTIAL CUSTOMERS.

|                        | <u>LOCAL</u>  | <u>LONG<br/>DISTANCE</u> | <u>TOTAL</u>  |
|------------------------|---------------|--------------------------|---------------|
| BUSINESS               | \$ 9.6        | \$19.5                   | \$29.1        |
| RESIDENTIAL            | <u>11.0</u>   | <u>18.0</u>              | <u>29.0</u>   |
| TOTAL VOICE            | \$20.6        | \$37.5                   | \$58.1        |
| <br>TOTAL DATA         | <u>\$ 1.1</u> | <u>\$ 3.3</u>            | <u>\$ 4.4</u> |
| <br>TOTAL VOICE & DATA | <u>\$21.7</u> | <u>\$40.8</u>            | <u>\$62.5</u> |

MAJOR VENDORS

|        |     |
|--------|-----|
| AT&T   | 90% |
| GTE    | 10% |
| MCI    |     |
| ITT    |     |
| OTHERS |     |

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VOICE AND DATA REVENUE  
1983 (cont'd)

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- AT&T'S 1982 REVENUES OF \$65 BILLION CAN BE USED AS A CHECK ON THE 1983 ESTIMATE FOR TOTAL VOICE AND DATA REVENUES. ASSUMING THAT 20% OF AT&T'S REVENUES CONSTITUTED EQUIPMENT AND OTHER SERVICES, AND ASSUMING THAT AT&T HAS 90% OF THE TRANSMISSION MARKET, THEN 1982 TOTAL VOICE AND DATA REVENUES WOULD HAVE BEEN ABOUT \$58 BILLION. FOR 1983, TOTAL VOICE AND DATA REVENUE WOULD THEN BE ABOUT \$64 BILLION, ASSUMING A GROWTH RATE OF 10%. FROM THIS POINT OF VIEW, \$62.5 BILLION IS NOT TOO CONSERVATIVE AN ESTIMATE FOR 1983.



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## FACTORS AFFECTING COMMUNICATIONS TRANSMISSION MARKET

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- TECHNOLOGY IS PERMITTING THE INTEGRATION OF VOICE AND DATA TRANSMISSION.
  - HIGH DATA-RATE TRANSMISSION (SATELLITE, PACKET NETWORKS)
  - FIBER OPTICS
  - DIGITAL PBX
- BREAKUP OF AT&T WILL MAKE IT EASIER FOR COMPETITORS TO ENTER THE MARKET.
  - AT&T MARKET SHARE EXPECTED TO SHRINK TO 75% BY 1990.
  - COMPETITORS WILL HAVE SAME ACCESS AS AT&T TO THE NEWLY INDEPENDENT LOCAL PHONE COMPANIES.
- ✓ ● VENDORS ARE MOVING TO OFFERING "ONE-STOP SHOPPING" FOR BUSINESS CUSTOMERS BY PROVIDING:
  - LONG DISTANCE TRANSMISSION
  - DATA TRANSMISSION
  - INTERNATIONAL PHONE SERVICE
  - CELLULAR MOBILE RADIO



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VOICE AND DATA TRANSMISSION - REVENUES (\$ BILLIONS)

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1985

|               | LOCAL       | AAGR | LONG DISTANCE | AAGR | TOTAL       | AAGR |
|---------------|-------------|------|---------------|------|-------------|------|
| • BUSINESS    | \$12        |      | \$27          |      | \$39        |      |
| • RESIDENTIAL | <u>\$14</u> |      | <u>\$25</u>   |      | <u>\$39</u> |      |
| • TOTAL       | <u>\$26</u> | +10% | <u>\$52</u>   | +14% | <u>\$78</u> | +12% |

1990

|               | LOCAL       | AAGR | LONG DISTANCE | AAGR | TOTAL        | AAGR   |
|---------------|-------------|------|---------------|------|--------------|--------|
| • BUSINESS    | \$19        |      | \$47          |      | \$66         |        |
| • RESIDENTIAL | <u>\$23</u> |      | <u>\$40</u>   |      | <u>\$63</u>  |        |
| • TOTAL       | <u>\$42</u> | +10% | <u>\$87</u>   | +11% | <u>\$129</u> | +10.5% |

AAGR = AVERAGE ANNUAL GROWTH RATE



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VERTICAL MARKETS  
VOICE AND DATA TRANSMISSION  
PERCENT OF REVENUES GENERATED

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1983

|                                                                     |           |
|---------------------------------------------------------------------|-----------|
| DISCRETE MANUFACTURING                                              | 23%       |
| PROCESS MANUFACTURING                                               | 13%       |
| HOTELS                                                              | 8%        |
| FEDERAL GOVERNMENT (EXC. MILITARY)                                  | 7%        |
| INSURANCE                                                           | 6%        |
| BANKING                                                             | 6%        |
| PROFESSIONAL SERVICES                                               | 4%        |
| WHOLESALE                                                           | 4%        |
| AIR TRANSPORT                                                       | 4%        |
| RETAIL                                                              | 3%        |
| STATE AND LOCAL GOVERNMENT                                          | 3%        |
| OTHER TRANSPORT                                                     | 3%        |
| AGRICULTURE, MINING, GOVERNMENT                                     | 3%        |
| REAL ESTATE                                                         | 2%        |
| COMPUTER SERVICES COMPANY'S                                         | 2%        |
| OTHER (BROKERS, HEALTHCARE, UTIL-<br>ITIES, ETC.) EACH LESS THAN 2% | <u>9%</u> |
| TOTAL                                                               | 100%      |



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## VERTICAL MARKETS

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### VOICE AND DATA TRANSMISSION

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- NO SIGNIFICANT CHANGE IN THE PERCENT OF REVENUES GENERATED BY EACH VERTICAL MARKET IS EXPECTED THROUGH 1990.
- MANUFACTURING TENDS TO BE A NATIONWIDE TYPE OF BUSINESS UNLIKE MOST SERVICE TYPE INDUSTRIES.
- DUN'S MARKETING SERVICES BREAKS OUT THE NUMBER OF COMPANIES IN THE U.S. REPORTING ANNUAL SALES OF \$50 MILLION OR MORE AND HAVING 10 OR MORE LOCATIONS FROM WHICH THEY DO BUSINESS:
  - 1500 MANUFACTURING COMPANIES AND
  - 1000 BANKING, FINANCIAL, INSURANCE AND SERVICE COMPANIES
- AS THE ECONOMY BECOMES MORE SERVICE ORIENTED, MANUFACTURERS WILL BECOME LESS LABOR INTENSIVE BUT MORE DATA INTENSIVE.
  - AUTOMATED SHOP FLOORS (ROBOTICS)
  - WORLDWIDE MANUFACTURING LOCATIONS
  - CENTRAL DATA BASES AND LOCAL PROCESSING



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## VERTICAL MARKETS

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### VOICE AND DATA TRANSMISSION (cont'd)

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- COMMUNICATIONS NEEDS OF MANUFACTURING SHOULD REMAIN FAIRLY HIGH.
- THE BANKING, FINANCIAL AND INSURANCE INDUSTRIES ARE NOT GEOGRAPHICALLY DISPERSED. /
- MOSTLY INTRACITY AND INTRAFACILITY COMMUNICATIONS.
- AS BANK DEREGULATION PROCEEDS, INTERSTATE BANKING AND NATIONWIDE NETWORKS OF AUTOMATED TELLER MACHINES WILL INCREASE THE TELECOMMUNICATIONS REQUIREMENTS OF BANKING INSTITUTIONS. AS A RESULT, BANKING'S PERCENT OF VOICE AND DATA TRANSMISSION REVENUES WILL INCREASE TO 12% FROM 6%.



VERTICAL MARKET DISTRIBUTION  
VOICE AND DATA TRANSMISSION  
1983 (\$ BILLIONS)

|                        | <u>LONG DISTANCE</u> | <u>LOCAL</u>  | <u>TOTAL</u>  |
|------------------------|----------------------|---------------|---------------|
| DISCRETE MANUFACTURING | \$5.2                | \$2.5         | \$7.7         |
| PROCESS MANUFACTURING  | 3.0                  | 1.4           | 4.4           |
| HOTELS                 | 1.8                  | .9            | 2.7           |
| FEDERAL GOVERNMENT     | 1.6                  | .7            | 2.3           |
| INSURANCE              | 1.4                  | .6            | 2.0           |
| BANKING                | 1.4                  | .6            | 2.0           |
| OTHER                  | <u>8.4</u>           | <u>4.0</u>    | <u>12.4</u>   |
| TOTAL                  | <u>\$22.8</u>        | <u>\$10.7</u> | <u>\$33.5</u> |

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VERTICAL MARKET DISTRIBUTION  
VOICE AND DATA TRANSMISSION  
1985 (\$ BILLIONS)

|                        | <u>LONG DISTANCE</u> | <u>LOCAL</u>  | <u>TOTAL</u>  |
|------------------------|----------------------|---------------|---------------|
| DISCRETE MANUFACTURING | \$6.2                | \$2.8         | \$9.0         |
| PROCESS MANUFACTURING  | 3.5                  | 1.6           | 5.1           |
| HOTELS                 | 2.2                  | 1.0           | 3.2           |
| FEDERAL GOVERNMENT     | 1.9                  | .8            | 2.7           |
| INSURANCE              | 1.6                  | .7            | 2.3           |
| BANKING                | 1.6                  | .7            | 2.3           |
| OTHER                  | <u>10.0</u>          | <u>4.4</u>    | <u>14.4</u>   |
| TOTAL                  | <u>\$27.0</u>        | <u>\$12.0</u> | <u>\$39.0</u> |



VERTICAL MARKET DISTRIBUTION

VOICE AND DATA TRANSMISSION

1990 (\$ BILLIONS)

|                        | <u>LONG DISTANCE</u> | <u>LOCAL</u>  | <u>TOTAL</u>  |
|------------------------|----------------------|---------------|---------------|
| DISCRETE MANUFACTURING | \$10.8               | \$4.4         | \$15.2        |
| PROCESS MANUFACTURING  | 6.1                  | 2.5           | 8.6           |
| HOTELS                 | 3.8                  | 1.5           | 5.3           |
| FEDERAL GOVERNMENT     | 3.3                  | 1.3           | 4.6           |
| INSURANCE              | 2.8                  | 1.1           | 3.9           |
| BANKING                | 2.8                  | 1.1           | 3.9           |
| OTHER                  | <u>17.4</u>          | <u>7.1</u>    | <u>24.5</u>   |
| TOTAL                  | <u>\$47.0</u>        | <u>\$19.0</u> | <u>\$66.0</u> |



COMMUNICATIONS MARKET SEGMENTS  
COMMUNICATIONS APPLICATIONS

INPUT



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## ELECTRONIC MAIL

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- MODES

- TELEX/TWX
- FACSIMILE
- COMPUTER BASED MESSAGE SYSTEMS (CBMS)
- VOICE MAIL

- SUPPLIERS

- SERVICE BUREAUS (75% OF TERMINAL-TO-TERMINAL MARKET)
  - . ITT (DIALCOM)
  - . GE
  - . GTE (TELEMAIL)
  - . WU (INFOCOM, EASY LINK, TELETEx, MAILGRAM, COMPUTER LETTER)
  - . READER'S DIGEST (SOURCE)
  - . TYMSHARE (ON-TIME)
  - . COMPU SERVE (H&R BLOCK)
- HARDWARE VENDORS
  - . IBM (EDD)
  - . WANG (MAILWAY)
  - . DEC (DEC MAIL)
  - . XEROX
- SOFTWARE VENDORS
  - . BOLT, BERANEK & MEWMAN (INFO MAIL)
  - . APPLIED DATA RESEARCH
  - . COMPUTER CORPORATION OF AMERICA (COMET)
- HYBRID SYSTEMS
  - . USPS (E-COM)
  - . MCI



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## ELECTRONIC MAIL

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- SERVICE REVENUE AND EQUIPMENT (\$ BILLIONS)

| <u>1983</u> | <u>1985</u> | <u>AAGR</u> | <u>1990</u> | <u>AAGR</u> |
|-------------|-------------|-------------|-------------|-------------|
| \$1.45      | \$2.27      | 25%         | \$8.4       | 30%         |

END USER EXPENDITURES FOR ELECTRONIC MAIL SERVICES AND EQUIPMENT, INCLUDING SERVICE BUREAUS, HARDWARE (TERMINALS, FACSIMILE MACHINES, PERSONAL COMPUTERS AND OTHER ELECTRONIC MAIL RELATED HARDWARE) AND SOFTWARE NECESSARY TO ACCOMPLISH ELECTRONIC MAIL.

- ELECTRONIC MAIL EMPLOYING PC'S (AS A PERCENT OF ELECTRONIC MAIL EQUIPMENT REVENUE)

| <u>1983</u> | <u>1985</u> | <u>1990</u> |
|-------------|-------------|-------------|
| 3%          | 50%         | 80%         |

- COMPUTER BASED MESSAGE SYSTEMS REVENUE (\$ MILLIONS)

| <u>1983</u> | <u>1985</u> | <u>AAGR</u> | <u>1990</u> | <u>AAGR</u> |
|-------------|-------------|-------------|-------------|-------------|
| \$57        | \$300       | 127%        | \$1,100     | 30%         |

- VOICE MAIL (\$ MILLIONS)

| <u>1983</u> | <u>1985</u> | <u>AAGR</u> | <u>1990</u> | <u>AAGR</u> |
|-------------|-------------|-------------|-------------|-------------|
| \$10        | \$150       | 300%        | \$700       | 36%         |

AAGR = AVERAGE ANNUAL GROWTH RATE



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## ELECTRONIC MAIL

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- KEY COMPONENT OF INTEGRATED OFFICE AUTOMATION SYSTEMS.
- WILL COMBINE WORD PROCESSING WITH SPREADSHEETS AND DATABASES.
- VOICE MAIL WILL BE PARTICULARLY WELL SUITED FOR THE SERVICE INDUSTRIES.
- INTERFACE STANDARDS WILL DEVELOP TO ALLOW INTER-COMPANY ELECTRONIC MAIL.
  - SPEED ORDER PROCESSING
  - IMPROVE INVENTORY CONTROL
  - ESTABLISH DIRECT-PAYMENT CHANNELS
- OVER TWO-THIRDS OF THE FORTUNE 500 CURRENTLY USE ELECTRONIC MAIL SYSTEMS.
- ELECTRONIC MAIL USERS WILL INCREASE FROM 100,000 IN 1982 TO 900,000 BY 1986.
- ELECTRONIC MAIL MESSAGES WILL INCREASE FROM 500 MILLION IN 1982 TO MORE THAN 2 BILLION BY 1987.



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## FACSIMILE

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● 75% OF THE EQUIPMENT MARKET IS SUPPLIED BY:

- BURROUGHS
- 3M
- RAPICOM
- PANAFAX
- NEC
- XEROX

EACH HAS 10% OR MORE OF THE MARKET

| U.S. (\$ MILLIONS) | 1983  | 1985  | REVENUES |  | 1990    | AAGR |
|--------------------|-------|-------|----------|--|---------|------|
|                    |       |       | AAGR     |  |         |      |
| EQUIPMENT SALES    | \$370 | \$530 | 20%      |  | \$1,110 | 16%  |
| TRANSMISSION       | \$244 | \$322 | 15%      |  | \$ 856  | 22%  |

NOTE: TRANSMISSION REVENUES ARE THOSE REVENUES COLLECTED BY COMMON CARRIERS FOR FAX TRANSMISSIONS OVER THEIR SWITCHED AND PRIVATE LINE FACILITIES; IT DOES NOT INCLUDE OTHER END-USER EXPENDITURES SUCH AS FEES FOR USING A FACSIMILE SERVICE OR BUREAU.

### WORLD (\$ BILLIONS)

|                                         |       |       |     |  |        |     |
|-----------------------------------------|-------|-------|-----|--|--------|-----|
| EQUIPMENT, TRANSMISSION<br>AND SUPPLIES | \$2.5 | \$4.0 | 26% |  | \$11.0 | 22% |
|-----------------------------------------|-------|-------|-----|--|--------|-----|

AAGR = AVERAGE ANNUAL GROWTH RATE



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## FACSIMILE

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- KEY ELEMENT IN ELECTRONIC MAIL SYSTEMS.
- USED FOR BULK TRANSMISSION OF DOCUMENTS (E.G., NEWSPAPER AND MAGAZINE PUBLISHERS).
- UNIQUE ABILITY TO TRANSMIT ORIGINAL DOCUMENTS QUICKLY WITHOUT REKEYING.
- IMPROVEMENTS IN TECHNOLOGY - BOTH EQUIPMENT AND TRANSMISSION - WILL RESULT IN CONTINUED DECREASE IN COST PER PAGE.
- NUMBER OF FACSIMILE MACHINES WILL GROW FROM 350,000 IN 1983 TO MORE THAN 1.4 MILLION BY 1992.
- FACSIMILE USERS EXPERIENCE SAVINGS IN:
  - PHONE LINE COSTS
  - LABOR COSTS
  - POSTAGE COSTS
  - IMPROVED PRODUCTIVITY OF STAFF



## TELECONFERENCING

- PRESENTLY HAMPERED BY HIGH END-USER COSTS AND TECHNOLOGICAL ROAD BLOCKS.
  - TRADEOFF BETWEEN:
    - MOTION (HI COST)
    - FREEZE FRAME (LOWER COST)
- CONCEPT IS VALID: MOVE INFORMATION RATHER THAN PEOPLE.
- WILL REQUIRE A CHANGE IN HOW PEOPLE CONDUCT THEIR BUSINESS.



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## TELECONFERENCING (cont'd)

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- THE RISING COST AND INEFFICIENCY OF BUSINESS TRAVEL WILL BE A DRIVING FORCE BEHIND TELECONFERENCING.
- THE NUMBER OF TELECONFERENCING ROOMS IS EXPECTED TO GROW FROM 2,500 IN 1983 TO MORE THAN 4,500 BY 1986.
- PRESENTLY, REGULAR USERS OF TELECONFERENCING USE THEIR OWN IN-HOUSE SYSTEMS; LITTLE USE IS BEING MADE OF PUBLIC ACCESS FACILITIES.



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## TELECONFERENCING BENEFITS

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- THE PRIMARY QUANTITATIVE BENEFIT ARISES FROM REDUCED TRAVEL COSTS.
  
- PRESENTLY THERE ARE MORE QUALITATIVE BENEFITS THAN QUANTITATIVE BENEFITS:
  - FASTER DECISION MAKING
  
  - TIMELY ACCESS TO INFORMATION
  
  - UNIFORM INTERPRETATION OF INFORMATION
  
  - BROADER PARTICIPATION OF EXPERTS
  
  - TEAM APPROACH TO RESOLVING PROBLEMS



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## TYPICAL TELECONFERENCING APPLICATIONS

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| <u>AREA</u>             | <u>APPLICATION</u>                                                  |
|-------------------------|---------------------------------------------------------------------|
| • FINANCIAL             | MEETING WITH BANKS.<br>FINANCIAL REVIEWS.                           |
| • MANUFACTURING         | RESOLVE MANUFACUTURING PROBLEMS.<br>BETTER ALLOCATION OF RESOURCES. |
| • PRODUCT DISTRIBUTION  | NEW PRODUCT INTRODUCTION TO REGIONAL<br>SALES FORCE.                |
| • TRAINING              | CENTRAL INSTRUCTOR,<br>DISPERSED STUDENTS.                          |
| • TECHNICAL DEVELOPMENT | REVIEW OF BLUEPRINTS, COMPUTER<br>PROGRAMS, AND DESIGNS.            |

INPUT



COMMUNICATIONS MARKET SEGMENTS  
COMMUNICATIONS EQUIPMENT

INPUT



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SUBSCRIBER AND TELEPHONE EQUIPMENT -  
WORLDWIDE REVENUES (\$ BILLIONS)

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|                                                   | <u>1983</u> | <u>1985</u> | <u>AAGR</u> | <u>1990</u> | <u>AAGR</u> |
|---------------------------------------------------|-------------|-------------|-------------|-------------|-------------|
| ● SUBSCRIBER EQUIPMENT                            | \$20        | \$30        | 22%         | \$51        | 11%         |
| - TELEPHONES                                      |             |             |             |             |             |
| - PBX                                             |             |             |             |             |             |
| - TELEX                                           |             |             |             |             |             |
| - CABLE TV                                        |             |             |             |             |             |
| - FAX                                             |             |             |             |             |             |
| - OTHER EQUIPMENT TO SEND<br>AND RECEIVE MESSAGES |             |             |             |             |             |
| ● TELEPHONE COMPANY EQUIPMENT                     | \$39        | \$44        | 9%          | \$66        | 8%          |
| - SWITCHES                                        |             |             |             |             |             |
| - CABLE                                           |             |             |             |             |             |
| - FIBER OPTICS                                    |             |             |             |             |             |
| - OTHER                                           |             |             |             |             |             |
| ● SUPPLIERS                                       |             |             |             |             |             |
| <u>U.S.</u>                                       |             |             |             |             |             |
| - WESTERN ELECTRIC                                |             |             |             |             |             |
| - GTE                                             |             |             |             |             |             |
| - MCI                                             |             |             |             |             |             |
| - ROLM                                            |             |             |             |             |             |
| <u>FOREIGN</u>                                    |             |             |             |             |             |
| - PLESSEY                                         |             |             |             |             |             |
| - SIEMANS                                         |             |             |             |             |             |
| - NEC                                             |             |             |             |             |             |
| - ERICSSON/HONEYWELL                              |             |             |             |             |             |

AAGR = AVERAGE ANNUAL GROWTH RATE

INPUT



=====  
PBX  
=====

U.S. EQUIPMENT REVENUES  
(\$ BILLIONS)

| <u>1983</u> | <u>1985</u> | <u>AAGR</u> | <u>1990</u> | <u>AAGR</u> |
|-------------|-------------|-------------|-------------|-------------|
| \$3.5       | \$5.0       | 20%         | \$10.0      | 15%         |

SUPPLIERS

AT&T

ROLM

NORTHERN TELECOM

MITEL

THESE COMPANIES COMMAND 2/3 OF THE MARKET.

AAGR = AVERAGE ANNUAL GROWTH RATE

INPUT



## PBX

- FOURTH GENERATION PBX'S WILL ALLOW BUSINESSES TO HAVE ONE INTEGRATED SYSTEM FOR:
  - VOICE AND DATA SWITCHING
  - ELECTRONIC MAIL
  - AUTOMATIC TELEPHONE ANSWERING
  - VOICE MAIL (STORE AND FORWARD)
  - CALL FORWARDING
  - FACSIMILE TRANSMISSION
- KEY FACTORS FOR PBX MARKETING:
  - DIRECT SALES
  - AFTER SALES SERVICE
  - DISTRIBUTION
- TECHNOLOGY WILL BE MORE OR LESS THE SAME, BUT MUST INTERFACE WITH THE HUNDREDS OF PROTOCOLS THAT NOW EXIST.



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FOURTH GENERATION PBX AS THE COMMUNICATIONS HUB

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USER

DIGITAL STATIONS

ANALOG STATIONS

VIDEO

DATA NETWORKS

COMPUTERS

TERMINALS

WORKSTATIONS

COMMUNICATING WORD PROCESSOR

FACSIMILE

TRANSMISSION

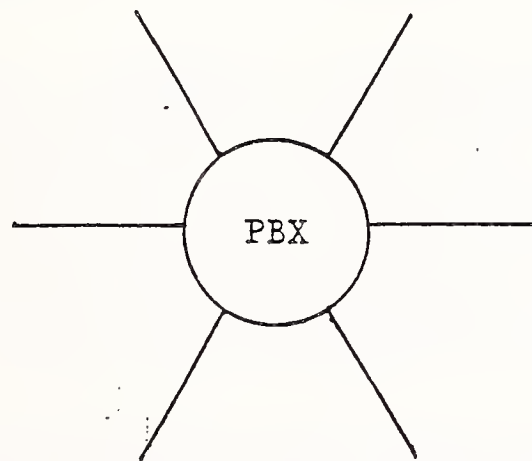
X.25 PACKET NETWORK

SATELLITE

TIE LINES

T1 CHANNELS

EXCHANGE TRUNKS



INPUT



## PBX

- GROWTH IN PBX'S WILL BE TIED TO THE GENERAL TREND TOWARDS OFFICE AUTOMATION (OA).
  - OA CONSISTS OF INTERCONNECTING "SMART" TERMINALS (COMPUTERS PROGRAMMED TO PERFORM DATA AND/OR WORD PROCESSING) AND REMOTE TERMINALS WHICH ARE WIRED TO FORM A LOCAL AREA NETWORK (LAN).
  - PBX'S SERVE TWO FUNCTIONS:
    1. ALLOW MACHINES TO BE INTERCONNECTED.
    2. PERFORM CENTRAL SWITCHING TO CONTROL INTEGRATED VOICE AND DATA.
- PBX GROWTH WILL SLOW TOWARDS 1990, WITH THE MARKET BECOMING SATURATED. SALES WILL BE PRE-DOMINANTLY FOR REPLACEMENT RATHER THAN FOR NEW SYSTEMS.



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FIBER OPTICS - REVENUES (\$ MILLIONS)

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|   |       | SALES OF FIBER OPTIC CABLE |             |             |             |             |
|---|-------|----------------------------|-------------|-------------|-------------|-------------|
|   |       | <u>1983</u>                | <u>1985</u> | <u>AAGR</u> | <u>1990</u> | <u>AAGR</u> |
| • | U.S.  | \$238                      | \$414       | +32%        | \$1,500     | 29%         |
| • | WORLD | \$655                      | \$1,124     | +31%        | \$3,000     | 21%         |

• KEY VENDORS

- BELL LABS
- WESTERN ELECTRIC
- SIECOR (JOINT VENTURE BETWEEN SIEMANS AND CORNING GLASS)
- HARRIS
- M/A COM
- TIMES FIBER

AAGR = AVERAGE ANNUAL GROWTH RATE

— INPUT —



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## FIBER OPTICS

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- NON-TELECOMMUNICATIONS APPLICATIONS INCLUDE:
  - WORD PROCESSING
  - POINT-OF-SALE TERMINALS
  - AUTOMOTIVE SYSTEMS
  - CONSUMER PRODUCTS
- FIBER OPTICS OFFER SEVERAL ADVANTAGES:
  - HIGHER BANDWIDTHS ALLOW FOR CARRYING MORE DATA AND FOR FASTER SWITCHING.
  - NO ELECTRO-MAGNETIC INTERFERENCE.
  - LONG DISTANCE SPACING BETWEEN SIGNAL AMPLIFIERS.
  - SMALLER SIZE THAN COPPER
- GROWTH AREAS FOR FIBER OPTICS INCLUDE:
  - HIGH-SECURITY APPLICATIONS
  - HIGH SPEED, NON-SWITCHED, DATA COMMUNICATIONS.
- FIBER OPTICS ARE PARTICULARLY USEFUL IN LOCAL AREA NETWORKS, BUT SO FAR HAVE BEEN USED IN VERY FEW.
  - DETERRENT IS THE HIGH COST OF ELECTRONICS AND OPTICS NEEDED FOR CONNECTIVITY.

— INPUT —



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## DIGITAL MICROWAVE

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### EQUIPMENT REVENUES

(\$ MILLION)

|       | <u>1983</u> | <u>1985</u> | <u>AAGR</u> | <u>1990</u> | <u>AAGR</u> |
|-------|-------------|-------------|-------------|-------------|-------------|
| U.S.  | \$210       | \$254       | 10%         | \$395       | 10%         |
| WORLD | \$400       | \$500       | 12%         | \$925       | 12%         |

- DIGITAL MICROWAVE REPLACING ANALOG MICROWAVE; PRESENTLY DIGITAL MICROWAVE HAS 55% OF THE MARKET, ANALOG 45%.
- MICROWAVE EQUIPMENT WILL BE ADVERSELY AFFECTED BY INCREASING SATELLITE LONG-DISTANCE COMMUNICATIONS.
- MICROWAVE WILL BE AN INTEGRAL PART OF COMMUNICATION NETWORKS, E.G., THE "TELEPORTS" WHICH ARE NOW SPRINGING UP, COMBINING SATELLITE, MICROWAVE AND CABLE.

AAGR = AVERAGE ANNUAL GROWTH RATE



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## SATELLITE TRANSMISSION

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|                                                       | <u>1983</u> | <u>1985</u> | <u>AAGR</u> | <u>1990</u> | <u>AAGR</u> |
|-------------------------------------------------------|-------------|-------------|-------------|-------------|-------------|
| REVENUES FOR<br>SATELLITE SERVICES -<br>(\$ MILLIONS) | \$288       | \$377       | 15%         | \$1,000     | 22%         |

AAGR = AVERAGE ANNUAL GROWTH RATE

- THIS INCLUDES
  - REVENUES FOR USING THE SATELLITE, E.G.
    - . LEASING TRANSPONDERS
    - . TRANSMISSION REVENUES
- THIS DOES NOT INCLUDE
  - REVENUES ASSOCIATED WITH THE SATELLITES THEMSELVES, E.G.
    - . SATELLITE(HARDWARE)
    - . LAUNCHING
    - . GROUND STATIONS

INPUT



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## SATELLITE TRANSMISSION (cont'd)

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### SATELLITE SERVICES

COMSAT

WESTERN UNION

SBS

GTE

### SATELLITE MANUFACTURERS

RCA

HUGHES AIRCRAFT

- THE MARKET FOR SATELLITE TRANSMISSION HAS NOT MATERIALIZED AS EXPECTED.
- TWO PROMISING AREAS HAVE BEEN SLOW IN DEVELOPING:
  - BULK DATA TRANSMISSION
  - TELECONFERENCING
- CABLE TV OPERATORS, WHO ARE LARGE USERS OF SATELLITE TRANSPONDERS, HAVE BEEN FEELING A FINANCIAL SQUEEZE IN THEIR OPERATIONS. BY 1984 THERE COULD BE AN OVERSUPPLY OF SATELLITE TRANSPONDERS



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## SATELLITE TRANSMISSION

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- ADVANTAGES:

- HI DATA RATE TRANSMISSION
- GEOGRAPHICALLY UNIFORM SERVICES
- RELIABILITY AND LOW ERROR RATE
- COMMUNICATION COSTS THAT ARE DISTANCE INSENSITIVE
- POINT-TO-MULTI-POINT EFFICIENCIES

- FUTURE DEVELOPMENTS:

- DIRECT BROADCAST SATELLITES (BEAMS PROGRAMS DIRECTLY TO HOMES).
- FOR LONG-HAUL TRANSMISSIONS, SATELLITES ARE VERY COST EFFICIENT.
- PROVIDE SERVICES TO DISPERSED POPULATIONS, NOT ECONOMICAL TO CABLE.
- BROADCAST TRANSMISSION (VIDEO CONFERENCE)
- PROVIDE ACCESS TO DISTRIBUTED DATABASES.

- MOST LIKELY CANDIDATES TO USE SATELLITE LINKS FOR BUSINESS COMMUNICATIONS ARE LARGE CORPORATIONS WITH HIGH-VOLUME PRIVATE COMMUNICATION NETWORKS THAT CRISS-CROSS THE U.S.



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CELLULAR MOBILE RADIO - REVENUES (\$ MILLIONS)

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|                                                                                                                                                    | <u>1983</u> | <u>1985</u> | <u>AAGR</u> | <u>1990</u> | <u>AAGR</u> |
|----------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-------------|-------------|-------------|
| • SERVICE                                                                                                                                          | *           | \$750       | NMF         | \$1,750     | 19%         |
| • EQUIPMENT                                                                                                                                        | *           | \$275       | NMF         | \$ 450      | 12%         |
| • SERVICE REVENUES ARE THOSE GENERATED BY USING THE CELLULAR SYSTEMS.                                                                              |             |             |             |             |             |
| • EQUIPMENT REVENUES ARE END-USER EXPENDITURES AND DO NOT INCLUDE EQUIPMENT PURCHASED BY THE CARRIERS TO OPERATE AND MAINTAIN THE CELLULAR SYSTEM. |             |             |             |             |             |
| • KEY PLAYERS                                                                                                                                      |             |             |             |             |             |
| - AMPS (AT&T)                                                                                                                                      |             |             |             |             |             |
| - GTE MOBILNET                                                                                                                                     |             |             |             |             |             |
| - MOTOROLA                                                                                                                                         |             |             |             |             |             |

NMF = NO MEANINGFUL FIGURE

\*NOTE: CELLULAR MOBILE RADIO SERVICE WAS INITIATED IN DECEMBER, 1983  
IN LIMITED MARKETS. NO ACTUAL FIGURES FOR 1983 ARE AVAILABLE.

AAGR = AVERAGE ANNUAL GROWTH RATE



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## CELLULAR MOBILE RADIO

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- OFFERS THE POTENTIAL FOR MEETING THE VOICE AND DATA COMMUNICATION NEEDS OF THE TRAVELLING EXECUTIVE, LEADING TO THE CONCEPT OF THE "MOBILE OFFICE."
- GROWTH IN DEMAND WILL DEPEND ON HOW QUICKLY SUBSCRIBER COSTS COME DOWN AND HOW QUICKLY A "PORTABLE" TELEPHONE COMES TO MARKET.
  - HIGH COST TO SUBSCRIBERS
    - \$2,500 FOR EQUIPMENT
    - \$150/MONTH IN CHARGES
- TOTAL U.S. USER BASE COULD EXCEED ONE MILLION BY 1990.
- VERTICAL MARKETS HAVING THE GREATEST POTENTIAL:
  - CONSTRUCTION
  - JOURNALISM
  - MEDICINE
  - LAW
  - SALES



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LOCAL AREA NETWORKS

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- INSTALLED BASE OF EQUIPMENT (\$ MILLIONS)

| <u>1983</u> | <u>1985</u> | <u>1990</u> |
|-------------|-------------|-------------|
| \$100       | \$1,200     | \$3,200     |

- VENDORS

- XEROX
- DEC
- ALTOS
- DATAPoint
- CONTEL

- OVER 100 SUPPLIERS OF LAN'S



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## LOCAL AREA NETWORKS

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- LAN'S ALLOW HIGH-SPEED COMMUNICATION IN A PARTICULAR AREA, LIMITED TO DISTANCES OF A FEW THOUSAND FEET.
  - OVER 60% OF BUSINESS COMMUNICATION TAKES PLACE WITHIN THIS AREA.
- TECHNOLOGY IS WELL DEVELOPED, BUT LACK OF STANDARDS AND EQUIPMENT INCOMPATIBILITY ARE PRESENT STUMBLING BLOCKS.
- BENEFITS LAN'S PROVIDE:
  - SHARING PERIPHERALS AND BEING ABLE TO MOVE THEM AROUND EASILY.
  - ACCESSING INFORMATION EASILY AND QUICKLY
  - IMPROVED PERSONAL COMMUNICATIONS.
- THE NUMBER OF LAN'S INSTALLED WILL INCREASE FROM ABOUT 12,000 IN 1983 TO ALMOST 90,000 BY 1986.



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## VALUE ADDED NETWORKS

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### REVENUES (\$ MILLIONS)

| <u>1983</u> | <u>1985</u> | <u>AAGR</u> | <u>1990</u> | <u>AAGR</u> |
|-------------|-------------|-------------|-------------|-------------|
| \$230       | \$400       | 33%         | \$995       | 20%         |

### KEY VENDORS (60% OF THE MARKET)

TYMNET

TELENET

- THESE ARE REVENUES FOR USING THE VALUE ADDED NETWORKS, NOT FOR ANY NECESSARY EQUIPMENT.

AAGR = AVERAGE ANNUAL GROWTH RATE



## VALUE ADDED NETWORKS

- VAN'S ARE TECHNOLOGICALLY DEFINED AS PUBLICLY AVAILABLE PACKET-SWITCHED NETWORKS.
  - APPLICATIONS RUNNING ON VAN'S INCLUDE:
    - ELECTRONIC-MAIL
    - TIMESHARING
- VAN'S OFFER THE FOLLOWING FEATURES:
  - NETWORK MANAGMENT IS ASSUMED BY THE VENDOR.
  - HIGHER DEGREE OF RELIABILITY RESULTING FROM THE USE OF ALTERNATE ROUTING CAPABILITIES.
  - ADAPTABILITY TO A LARGE NUMBER OF OTHERWISE INCOMPATIBLE TERMINAL DEVICES.
  - ABILITY TO INTERFACE WITH A VARIETY OF COMPUTER SYSTEMS.
  - COMBINATION OF MESSAGE AND DATA TRAFFIC CAPABILITES.



FURTHER RESEARCH

INPUT



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## FURTHER RESEARCH

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CONDUCT PRIMARY RESEARCH TO:

- EXPLORE IN MORE DETAIL THE MARKETS FOR COMMUNICATION EQUIPMENT AND COMMUNICATION APPLICATIONS, INCLUDING:
  - ELECTRONIC MAIL
  - FACSIMILE
  - TELECONFERENCING
  - CELLULAR MOBILE RADIO
  - FIBER OPTICS
  - LAN'S
- DETERMINE THE CHARACTERISTICS OF THE USERS AND PURCHASERS OF THE COMMUNICATION EQUIPMENT AND COMMUNICATION APPLICATIONS LISTED ABOVE.
  - NON-TECHNICAL END USERS.
  - TECHNICAL COMMUNICATION MANAGERS



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## FURTHER RESEARCH (cont'd)

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- DETERMINE THE POTENTIAL FOR PUBLICATIONS ADDRESSING THESE AREAS.
  - FUTURE PUBLICATIONS
  - CURRENT MCGRAW-HILL PUBLICATIONS (DATA COMMUNICATIONS)
  - CURRENT COMPETITIVE PUBLICATIONS (OFFICE ADMINISTRATION AND AUTOMATION, THE OFFICE, MODERN OFFICE PROCEDURES, DATAMATION COMMUNICATIONS NEWS, ETC.)
- DETERMINE THE POTENTIAL FOR PUBLICATIONS ADDRESSING THE COMMUNICATIONS NEEDS OF PARTICULAR VERTICAL MARKETS AND INDUSTRIES.
- OBTAIN THE VIEWS OF SUPPLIERS OF COMMUNICATIONS EQUIPMENT AND APPLICATIONS REGARDING BOTH THE POTENTIAL OF THESE PUBLICATIONS AND VENDORS' WILLINGNESS TO ADVERTISE IN THEM.



## SOURCES OF INFORMATION

INPUT



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## SOURCES OF INFORMATION

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1. INPUT REPORTS
2. INPUT CONSULTING STAFF
3. INPUT FILES
4. PUBLISHED ARTICLES AND REPORTS ON TELE-  
COMMUNICATIONS INDUSTRY



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## RELATED INPUT REPORTS

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- MARKET OPPORTUNITIES IN NETWORK SERVICES. 1982
- IMPACT OF COMMUNICATIONS DEVELOPMENTS ON INFORMATION SERVICES VENDORS. 1981
- LOCAL AREA NETWORK DEVELOPMENTS. 1983
- INTERCOMPANY ELECTRONIC INFORMATION DISTRIBUTION. 1983
- NEW DIRECTIONS IN LOCAL NETWORKING. 1981
- DATA COMMUNICATIONS CONSIDERATION FOR NEW ON-LINE SYSTEMS. 1980
- NEW DIRECTIONS IN OPERATING SYSTEMS, COMMUNICATIONS, AND DBMS. 1982
- USER COMMUNICATION NETWORKS AND NEEDS. 1980





